NOTIFICATION APPLIANCE CIRCUIT VOLTAGE DROP & POWER REQUIREMENTS

CKT AV4: 77 WEST DESCRIPTION	QTY	CURRENT PER ITEM (AMPS)	TOTAL CURRENT PER ITEM
WHEELOCK STROBE 15 cd	–	0.5010	0.0000
WHEELOCK HORN/STROBE 15cd	–	0.0000	0.0000
WHEELOCK STROBE 30 cd	–	0.0300	0.0000
WHEELOCK HORN/STROBE 30 cd	–	0.0450	0.0000
WHEELOCK STROBE 75 cd	–	0.1650	0.0000
WHEELOCK HORN/STROBE 75 cd	–	0.1100	0.0000
WHEELOCK STROBE 110 cd	2	0.2200	0.4400
WHEELOCK HORN/STROBE 110 cd	–	0.1750	0.0000
WHEELOCK HORN	–	0.0000	0.0000
AUTOCALL BELL	2	0.0500	0.1000
AUTOCALL BELL/STROBE 75 cd	–	0.2150	0.0000
TOTAL NOTIFICATION APPLIANCES CURRENT			0.5400

VOLTAGE DROP (VD) CALCULATIONS

VD = {(I) (D) (21.6)}/CM
WHERE: I = CIRCUIT CURRENT
D = CONDUCTOR LENGTH (FT) ONE WAY
21.6 = CONSTANT
CM = WIRE CROSS-SECTIONAL AREA (CIRCULAR MILS)
VD = {(0.54 A) (380FT) (21.64)}/4110 = 1.078 V
%VD = {1.078 V / 24V} X 100 = 4.493 %
REMAINING VOLTS = 22.922

WIRE SIZE	CIRCULAR MILS
12AWG	6530
14AWG	4110
16AWG	2580
18AWG	1620
20AWG	1020

NOTIFICATION APPLIANCE CIRCUIT VOLTAGE DROP & POWER REQUIREMENTS

CKT AV2: 77 EAST DESCRIPTION	QTY	CURRENT PER ITEM (AMPS)	TOTAL CURRENT PER ITEM
WHEELOCK STROBE 15 cd	–	0.5010	0.0000
WHEELOCK HORN/STROBE 15cd	–	0.0000	0.0000
WHEELOCK STROBE 30 cd	–	0.0300	0.0000
WHEELOCK HORN/STROBE 30 cd	–	0.0450	0.0000
WHEELOCK STROBE 75 cd	–	0.1650	0.0000
WHEELOCK HORN/STROBE 75 cd	–	0.1100	0.0000
WHEELOCK STROBE 110 cd	3	0.2200	0.6600
WHEELOCK HORN/STROBE 110 cd	–	0.1750	0.0000
WHEELOCK HORN	–	0.0000	0.0000
AUTOCALL BELL	1	0.0500	0.0500
AUTOCALL BELL/STROBE 75 cd	–	0.2150	0.0000
TOTAL NOTIFICATION APPLIANCES CURRENT			0.7100

VOLTAGE DROP (VD) CALCULATIONS

VD = {(I) (D) (21.6)}/CM
WHERE: I = CIRCUIT CURRENT
D = CONDUCTOR LENGTH (FT) ONE WAY
21.6 = CONSTANT
CM = WIRE CROSS-SECTIONAL AREA (CIRCULAR MILS)
VD = {(0.71 A) (660FT) (21.64)}/4110 = 0.71 V
%VD = {0.71 V / 24V} X 100 = 10.261 %
REMAINING VOLTS = 21.537

WIRE SIZE	CIRCULAR MILS
12AWG	6530
14AWG	4110
16AWG	2580
18AWG	1620
20AWG	1020

BATTERY CALCULATIONS FAP-001,-002,-003-77

ITEM	DESCRIPTION	QTY	STANDBY CURRENT PER ITEM (AMPS)	TOTAL STANDBY CURRENT PER ITEM	ALARM CURRENT PER ITEM (AMPS)	TOTAL ALARM CURRENT PER ITEM
CP-35	FACP w/2ZN'S + AUD	1	0.1750	0.1750	0.5010	0.5010
PS-35	POWER SUPPLY	2	0.0000	0.0000	0.0000	0.0000
BC-35	BATTERY CHARGER	1	0.0450	0.0450	0.0300	0.0300
AA-30U	CLASS B BELL MODULE	3	0.0065	0.0195	0.0400	0.1200
AE-30U	CLASS B BELL MODULE	5	0.0065	0.0325	0.0400	0.2000
PM-32	MATRIX MODULE	1	0.0000	0.0000	0.0000	0.0000
RM-30U	RELEASE MODULE	–	0.0050	0.0000	1.5000	0.0000
SM-30	SWITCH MODULE	11	0.0000	0.0000	0.0450	0.4950
SR-32	6 RELAY MODULE	2	0.0000	0.0000	0.0450	0.0900
SR-35	8 RELAY MODULE	2	0.0000	0.0000	0.0210	0.0420
TC-30U	BATTERY TRANSFER	–	0.0300	0.0000	0.0150	0.0000
ZN-34US	SUPERVISORY MODULE	4	0.0100	0.0400	0.1100	0.4400
ZU-35	ZONE MODULE	7	0.0090	0.0630	0.1100	0.7700
ZU-35DS	ZONE MODULE/SD's	12	0.0090	0.1080	0.1100	1.3200
SMOKE	SMOKE DETECTOR	38	0.0001	0.0038	0.0010	0.0380
MOI	TRANSMITTER	1	0.1200	0.1200	0.1750	0.1750
MID	INPUT BOARD	3	0.0020	0.0060	0.0000	0.0000
PS-5A	POWER SUPPLY	1	0.0380	0.0380	0.0000	0.0000
TOTAL NOTIFICATION APPLIANCES CURRENT						4.0660
TOTAL SYSTEM CURRENT			STANDBY	0.6508	ALARM	8.3370

MIN. BATTERY CAPACITY = {(TOT. STANDBY CURRENT X STANDBY TIME) + (TOT. ALARM CURRENT X ALARM TIME)} X 1.25
MIN. BATTERY CAPACITY = {(0.6508 A X 24 HR) + (8.337 A X 0.083 HR)} X 1.25
MIN. BATTERY CAPACITY = {15.6192AHr + 0.692 AHr} X 1.25 = 20.389 AHr

NOTIFICATION APPLIANCE CIRCUIT VOLTAGE DROP & POWER REQUIREMENTS

CKT AV5: 77-244 DESCRIPTION	QTY	CURRENT PER ITEM (AMPS)	TOTAL CURRENT PER ITEM
WHEELOCK STROBE 15 cd	–	0.5010	0.0000
WHEELOCK HORN/STROBE 15cd	–	0.0000	0.0000
WHEELOCK STROBE 30 cd	–	0.0300	0.0000
WHEELOCK HORN/STROBE 30 cd	–	0.0450	0.0000
WHEELOCK STROBE 75 cd	–	0.1650	0.0000
WHEELOCK HORN/STROBE 75 cd	–	0.1100	0.0000
WHEELOCK STROBE 110 cd	3	0.2200	0.6600
WHEELOCK HORN/STROBE 110 cd	–	0.1750	0.0000
WHEELOCK HORN	–	0.0000	0.0000
AUTOCALL BELL	2	0.0500	0.1000
AUTOCALL BELL/STROBE 75 cd	0	0.0000	0.0000
TOTAL NOTIFICATION APPLIANCES CURRENT			0.7600

VOLTAGE DROP (VD) CALCULATIONS

VD = {(I) (D) (21.6)}/CM
WHERE: I = CIRCUIT CURRENT
D = CONDUCTOR LENGTH (FT) ONE WAY
21.6 = CONSTANT
CM = WIRE CROSS-SECTIONAL AREA (CIRCULAR MILS)
VD = {(0.76 A) (360FT) (21.64)}/4110 = 1.438 V
%VD = {1.438 V / 24V} X 100 = 5.991 %
REMAINING VOLTS = 22.562

WIRE SIZE	CIRCULAR MILS
12AWG	6530
14AWG	4110
16AWG	2580
18AWG	1620
20AWG	1020

NOTIFICATION APPLIANCE CIRCUIT VOLTAGE DROP & POWER REQUIREMENTS

CKT AV3: 79 DESCRIPTION	QTY	CURRENT PER ITEM (AMPS)	TOTAL CURRENT PER ITEM
WHEELOCK STROBE 15 cd	1	0.0600	0.0600
WHEELOCK HORN/STROBE 15cd	–	0.0000	0.0000
WHEELOCK STROBE 30 cd	–	0.0300	0.0000
WHEELOCK HORN/STROBE 30 cd	–	0.0450	0.0000
WHEELOCK STROBE 75 cd	–	0.1650	0.0000
WHEELOCK HORN/STROBE 75 cd	–	0.1100	0.0000
WHEELOCK STROBE 110 cd	–	0.1100	0.0000
WHEELOCK HORN/STROBE 110 cd	3	0.3070	0.9210
WHEELOCK HORN	–	0.0000	0.0000
AUTOCALL BELL	–	0.0500	0.0000
AUTOCALL BELL/STROBE 75 cd	–	0.2150	0.0000
TOTAL NOTIFICATION APPLIANCES CURRENT			0.9810

VOLTAGE DROP (VD) CALCULATIONS

VD = {(I) (D) (21.6)}/CM
WHERE: I = CIRCUIT CURRENT
D = CONDUCTOR LENGTH (FT) ONE WAY
21.6 = CONSTANT
CM = WIRE CROSS-SECTIONAL AREA (CIRCULAR MILS)
VD = {(0.981 A) (440FT) (21.64)}/4110 = 2.463 V
%VD = {2.463 V / 24V} X 100 = 10.261 %
REMAINING VOLTS = 21.537

WIRE SIZE	CIRCULAR MILS
12AWG	6530
14AWG	4110
16AWG	2580
18AWG	1620
20AWG	1020

NOTIFICATION APPLIANCE CIRCUIT VOLTAGE DROP & POWER REQUIREMENTS

CKT AV1: 77-108A DESCRIPTION	QTY	CURRENT PER ITEM (AMPS)	TOTAL CURRENT PER ITEM
WHEELOCK STROBE 15 cd	–	0.5010	0.0000
WHEELOCK HORN/STROBE 15cd	–	0.0000	0.0000
WHEELOCK STROBE 30 cd	–	0.0300	0.0000
WHEELOCK HORN/STROBE 30 cd	–	0.0450	0.0000
WHEELOCK STROBE 75 cd	–	0.1650	0.0000
WHEELOCK HORN/STROBE 75 cd	–	0.1100	0.0000
WHEELOCK STROBE 110 cd	–	0.1100	0.0000
WHEELOCK HORN/STROBE 110 cd	–	0.1750	0.0000
WHEELOCK HORN	–	0.0000	0.0000
AUTOCALL BELL	–	0.0500	0.0000
AUTOCALL BELL/STROBE 75 cd	1	0.2150	0.2150
TOTAL NOTIFICATION APPLIANCES CURRENT			0.2150

VOLTAGE DROP (VD) CALCULATIONS

VD = {(I) (D) (21.6)}/CM
WHERE: I = CIRCUIT CURRENT
D = CONDUCTOR LENGTH (FT) ONE WAY
21.6 = CONSTANT
CM = WIRE CROSS-SECTIONAL AREA (CIRCULAR MILS)
VD = {(0.215 A) (130FT) (21.64)}/4110 = 0.147 V
%VD = {0.147 V / 24V} X 100 = 0.612 %
REMAINING VOLTS = 23.853

WIRE SIZE	CIRCULAR MILS
12AWG	6530
14AWG	4110
16AWG	2580
18AWG	1620
20AWG	1020

FIRE ALARM SYSTEM FUNCTION CHART

SYSTEM EVENT / RESPONSE	ANNUNCIATE AT FACU	FIRE SIGNAL TO RECEIVER	TROUBLE SIGNAL TO LBNL RECEIVER	SUPERVISORY SIGNAL TO LBNL RECEIVER	OPERATE 77 NOTIFICATION DEVICES	OPERATE 77 UNIT SUB NOTIFICATION DEVICES	OPERATE 77 UTILITY BLDG NOTIFICATION DEVICES	OPERATE 79 NOTIFICATION DEVICE	PRE-RELEASE CO2	RELEASE CO2	DOOR HOLDER RELEASE	77 AHU SHUTDOWN	77 AHU-33 SHUTDOWN	77J TO N DRY CHEM RELEASE
77 FIRE CALL BOX	●	●			●						●	●		
77 HEAT DETECTOR	●	●			●						●	●		
77 FACP SMOKE DETECTOR	●	●			●						●	●		
77 DUCT SMOKE DETECTORS	●	●			●						●	●		
77 FIRE SPRINKLER WATERFLOW SWITCH	●	●			●						●	●		
77 VALVE SUPERVISORY SWITCHES	●			●										
77-165B PAINT SHOP SMOKE DETECTOR	●	●			●				●	●				
77-165B PAINT SHOP FENWAL PANEL	●		●											
77 RMS 125,161 DOOR SMOKE DETECTORS	●	●			●									
77-142C HSSD LVL 1 ALARM	●	●			●								●	
77-142C HSSD LVL 2 ALARM	●	●			●						●	●	●	
77-142C HSSD PANEL	●		●											
B77J TO N HEAT & SMOKE DETECTORS	●	●												●
B77J TO N POWER FAIL	●		●											
B77J TO N DRY CHEMICAL RELEASE	●	●												
77 UNIT SUBSTATION FCB & SMOKE DETECTOR	●	●				●								
77 UTILITY BLDG FCB & SMOKE DETECTOR	●	●					●							
79 FIRE CALL BOX	●	●						●						
79 HEAT DETECTOR	●	●						●						
79,79A FIRE SPRINKLER WATERFLOW SWITCH	●	●						●						
79,79A VALVE SUPERVISORY SWITCHES	●			●										
AC POWER FAILURE	●		●											
SYSTEM FAULT	●		●											

NOTIFICATION APPLIANCE CIRCUIT CURRENT

CKT AV1 – 77-108A	0.215
CKT AV2 – 77 EAST	0.710
CKT AV3 – 79	0.981
CKT AV4 – 77 WEST	0.540
CKT AV5 – 77-244	0.760
CKT AV6 – 77-165B PAINT SHOP	0.540
CKT AV7 – 77 UTILITY BLDG	0.270
CKT AV8 – 77 SUBSTATION	0.050
TOTAL NOTIFICATION APPLIANCES CURRENT	4.066

AS BUILT
–
–
10/22/13

PROFESSIONAL SEAL (IF REVISION APPLIES ONLY TO REVISED WORK)
ISSUE (PROGRESS, ESTIMATE, BID, CONSTRUCTION, CONFORMED, REVISION, RECORD)

REVISION NUMBER	DRAWN BY	CHECKED BY	APPR'D BY	DATE	REMARKS
_	LDD	LDD	MCD	10/22/13	AS BUILT

BLDG 77, 79 FIRE ALARM FUNCTION CHART & CALCULATIONS

DRAWN BY LDD	DATE 10/22/2013
CHECKED BY LDD	10/22/2013
APPROVED BY MCD	10/22/2013
SCALE AS NOTED	

UNIVERSITY OF CALIFORNIA
LAWRENCE BERKELEY NATIONAL LABORATORY
FACILITIES DIVISION

DRAWING NO. 4B77E171_	SHEET FA
PROJECT NO. 000000	1 OF 2